Oceanic Tailored Arrival Trials

Fuel, Noise, and Emissions

SFO Noise Roundtable

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The Boeing Company

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Fuel, Time, Noise, and Emissions

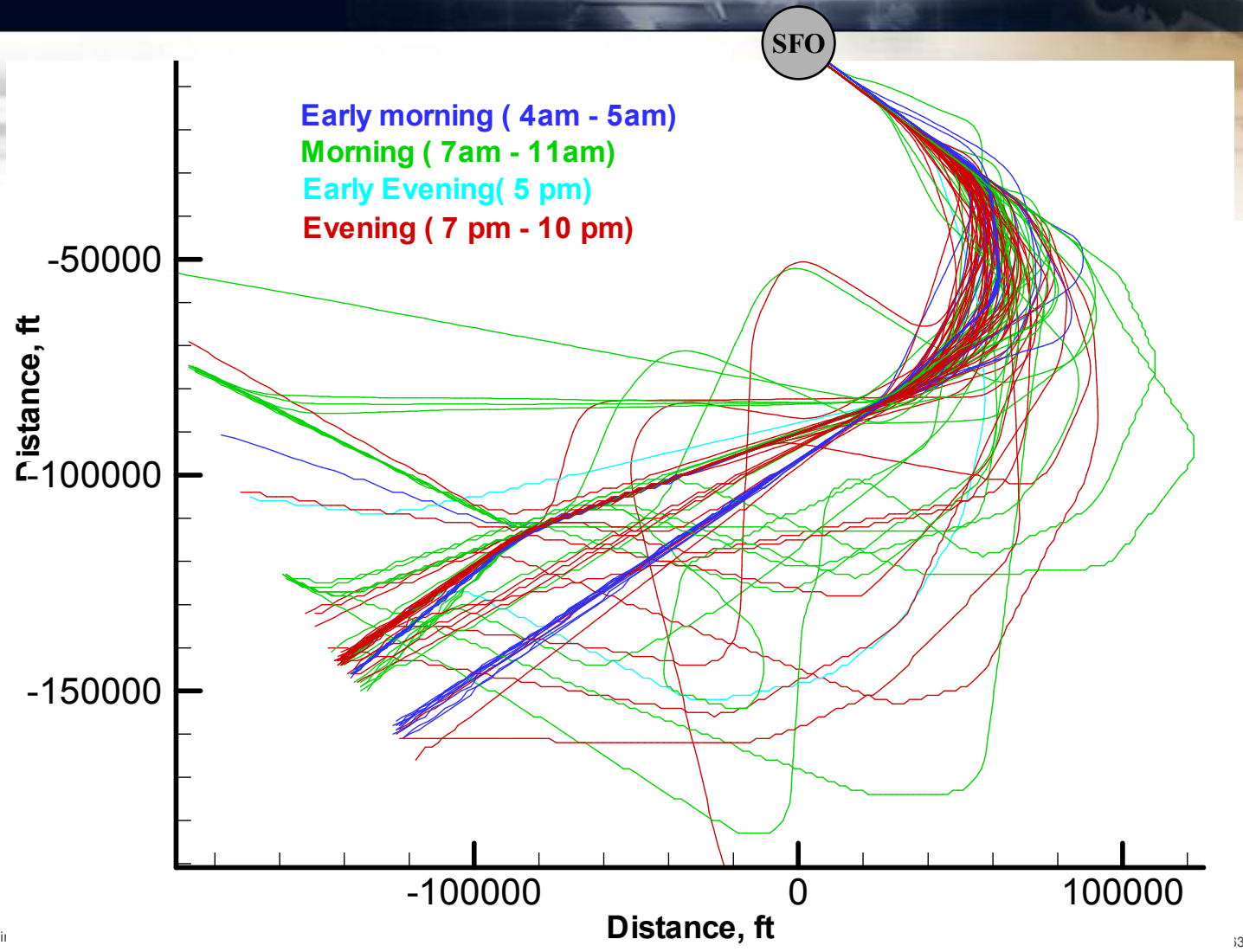
- **Method:**
  - Compare baseline and oceanic tailored arrival flights
    - Low-density and congested operations
  - Generate Boeing performance and FAA noise models
  - Compare fuel, time, noise, and emission differences

Number of Flights Included in Analysis

Operation	Phase 1	Phase 2	Phases 1 & 2
Oceanic tailored arrivals (participating UAL76 flights)	17	18	35
Low density baseline (nonparticipating UAL76 flights)	6	13	19
Congested baseline (all other 777 flights)	75	84	159
Total 777 flights	98	115	213

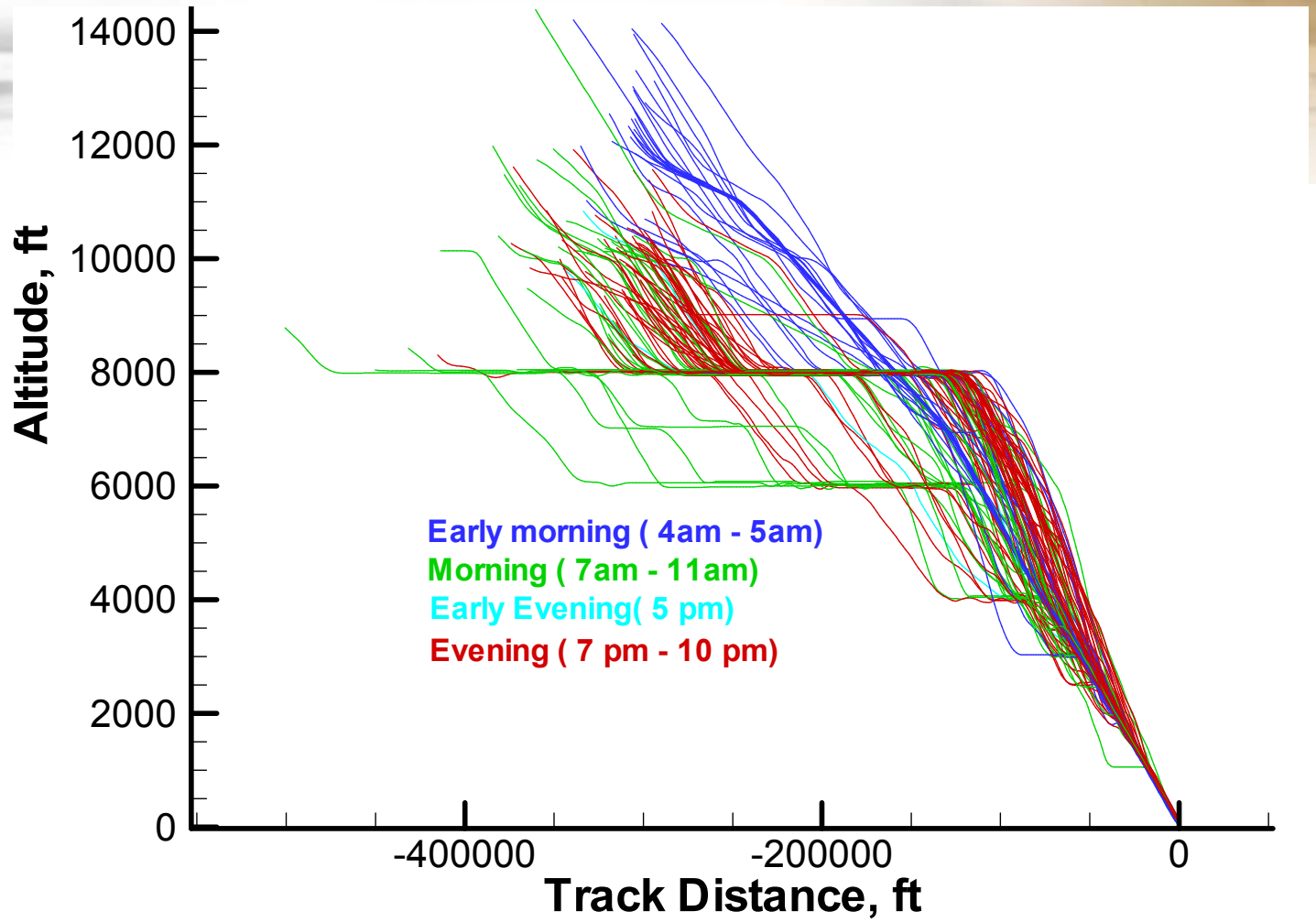
All B-777 CEP Track C Lateral Tracks

Dec 9 – Jan 6, 2007



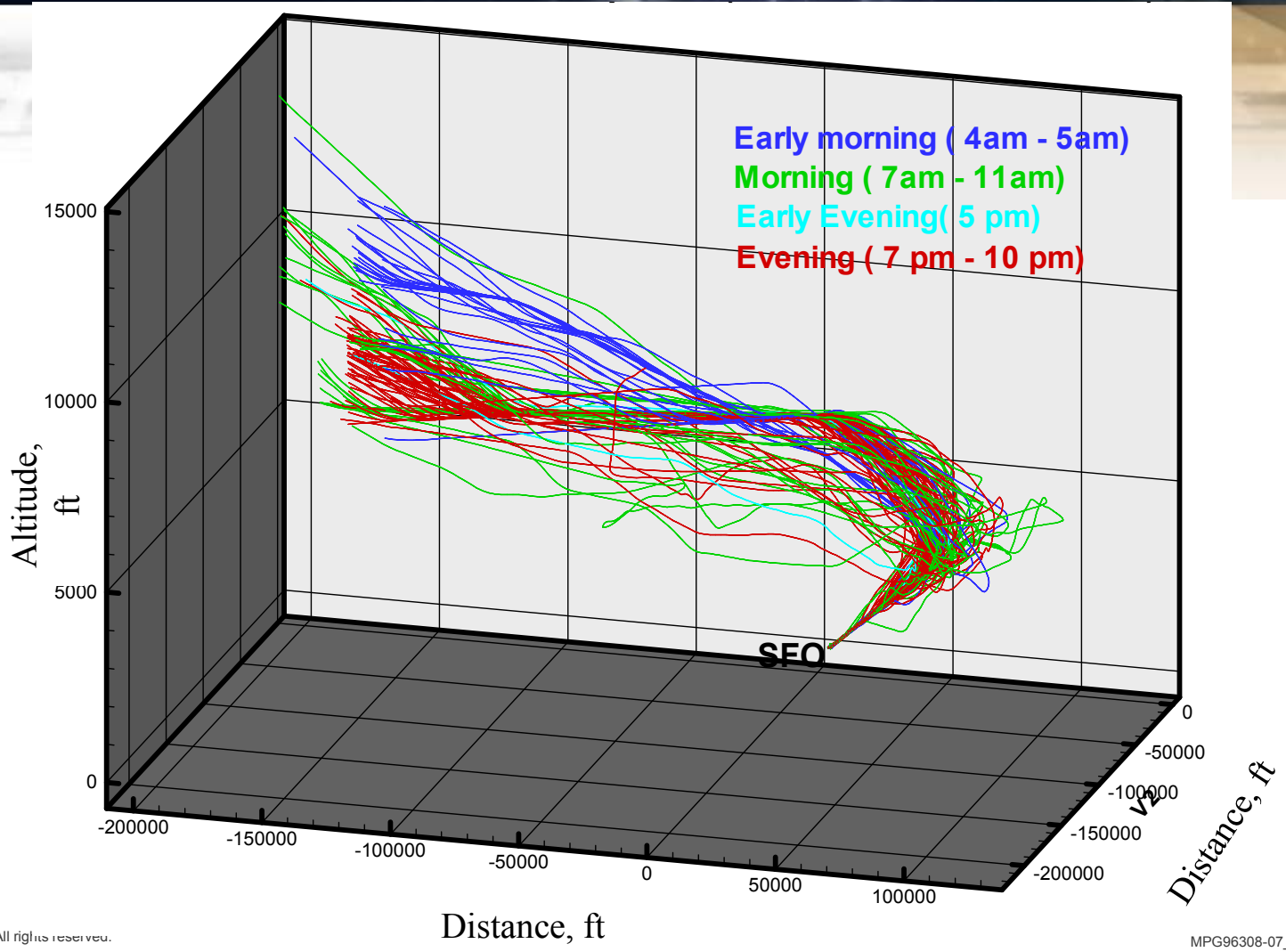
All B-777 CEP Track C Vertical Profiles

Dec 9 – Jan 6, 2007



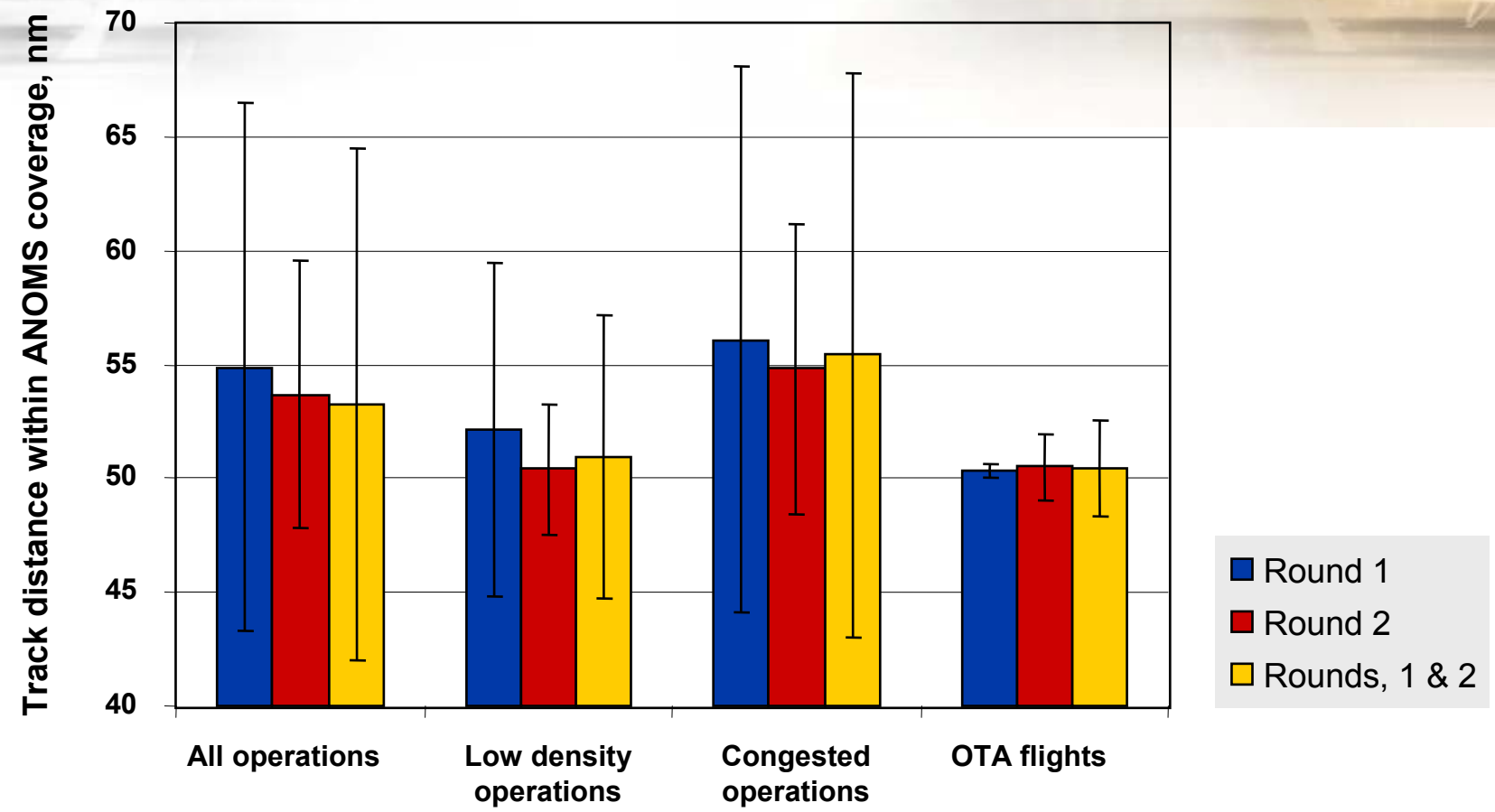
All B-777 CEP Track C Arrivals

Dec 9 – Jan 6, 2007



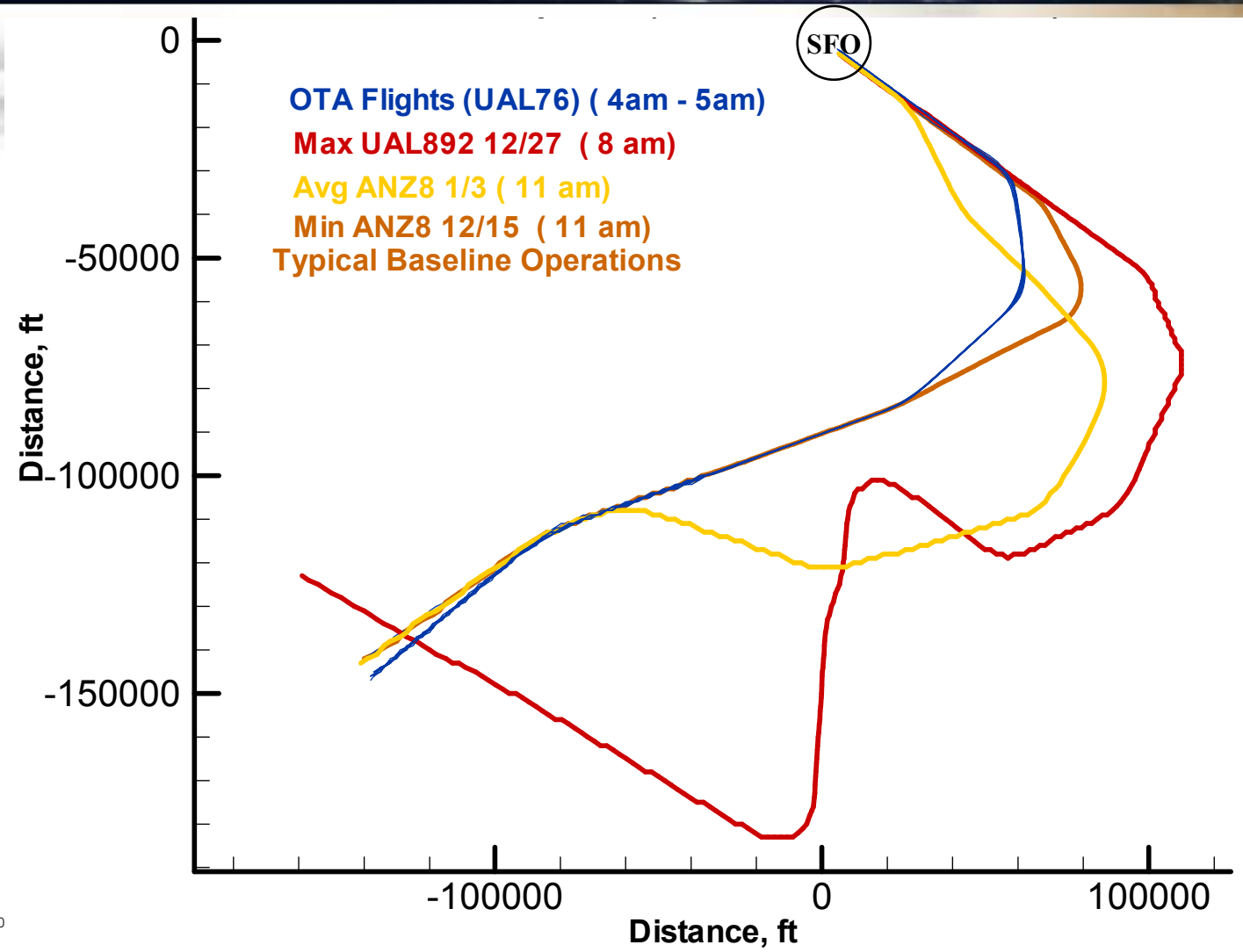
Vectoring within the SFO TRACON for 777 Operations

Mean and Two Sigma



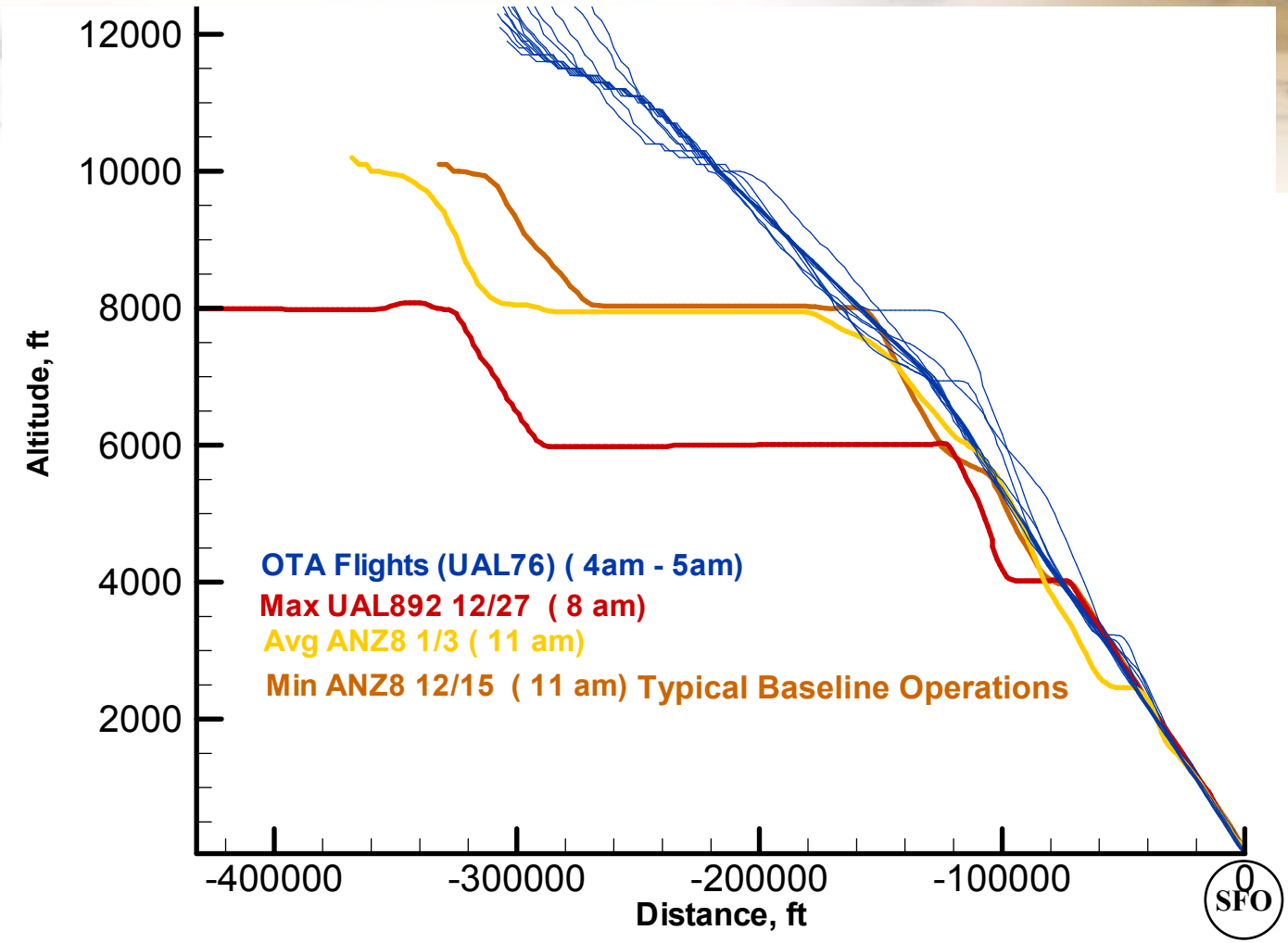
Lateral Path Comparison

Oceanic Tailored Arrival and Baseline Operations

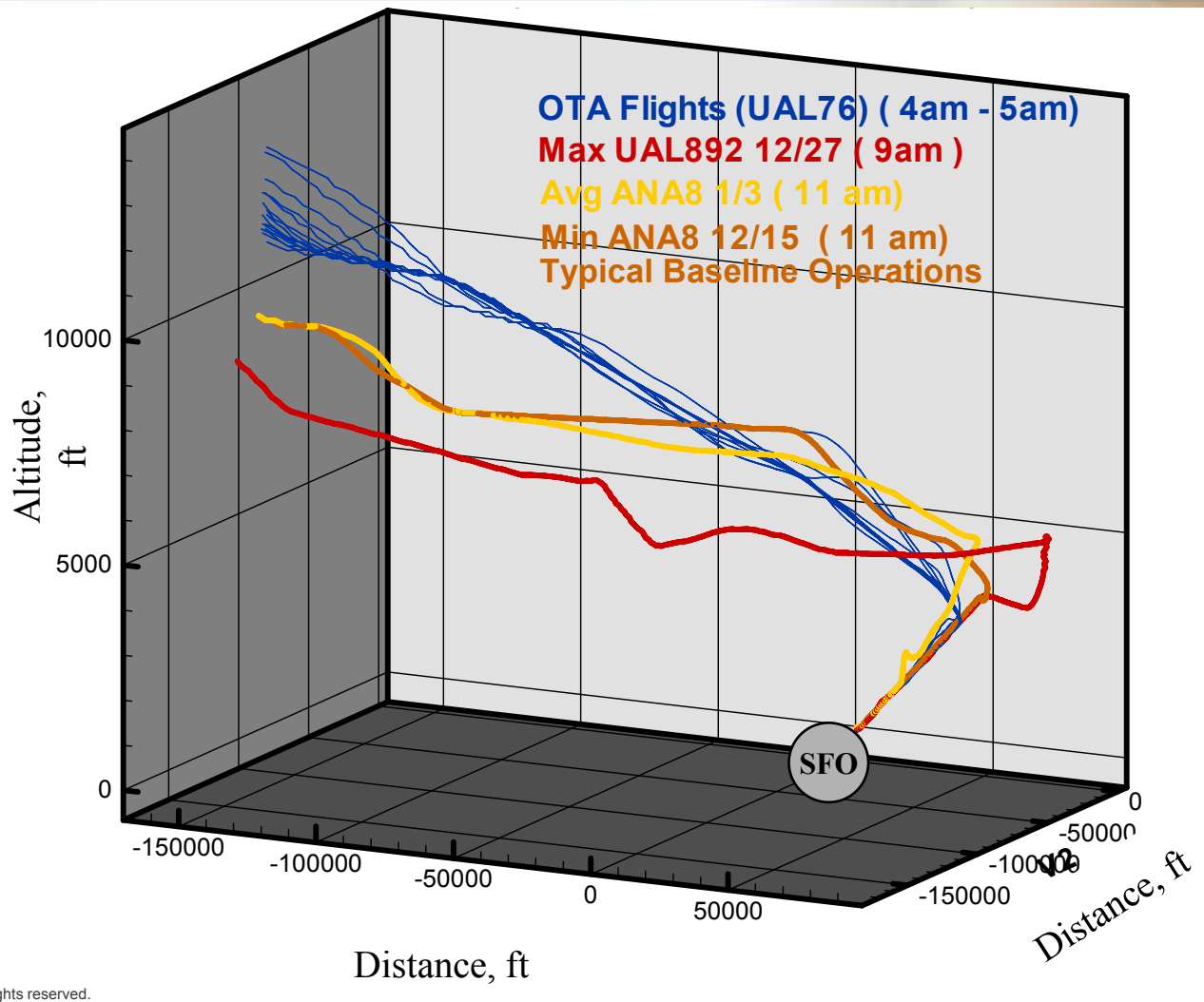


Vertical Profile Comparison

Oceanic Tailored Arrival and Baseline Operations



Arrival Comparison
Oceanic Tailored Arrival and Baseline Operations



Benefits of OTA for Low, Average, and Maximum Congested Operations

Fuel, Time, and Distance

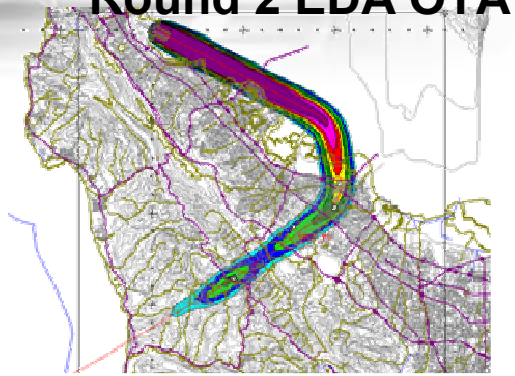
	WFCON(lbs)	Time(min)	Distance from CREAN to SFO (NM)
Basic OTA Profile	7192	39.2	232.5
OTA w/ EDA Profile (11k)	7477	40.2	232.5
Min Congestion	7230	40.1	238.7
Avg Congestion	7416	41.6	244.0
Max Congestion	11543	51.2	273.0

Δ Diff Rel. Basic OTA	WFCON(lbs)	Time(min)	Distance from CREAN to SFO (NM)
Min Congestion	38	0.9	6.2
Avg Congestion	225	2.4	11.5
Max Congestion	4351	12.0	40.4

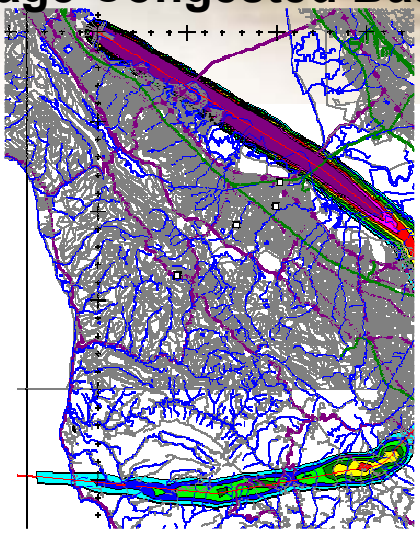
FAA Integrated Noise Model Predictions

Sound Exposure Level Contours

Round 2 EDA OTA

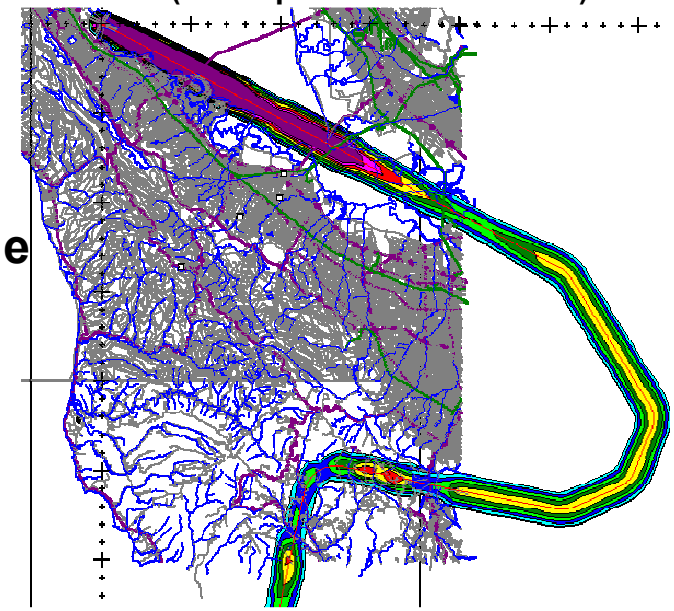


Average Congested Baseline

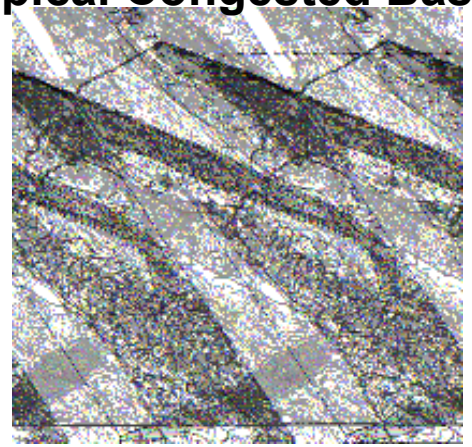


Max Congested Baseline

(incomplete terrain effects)



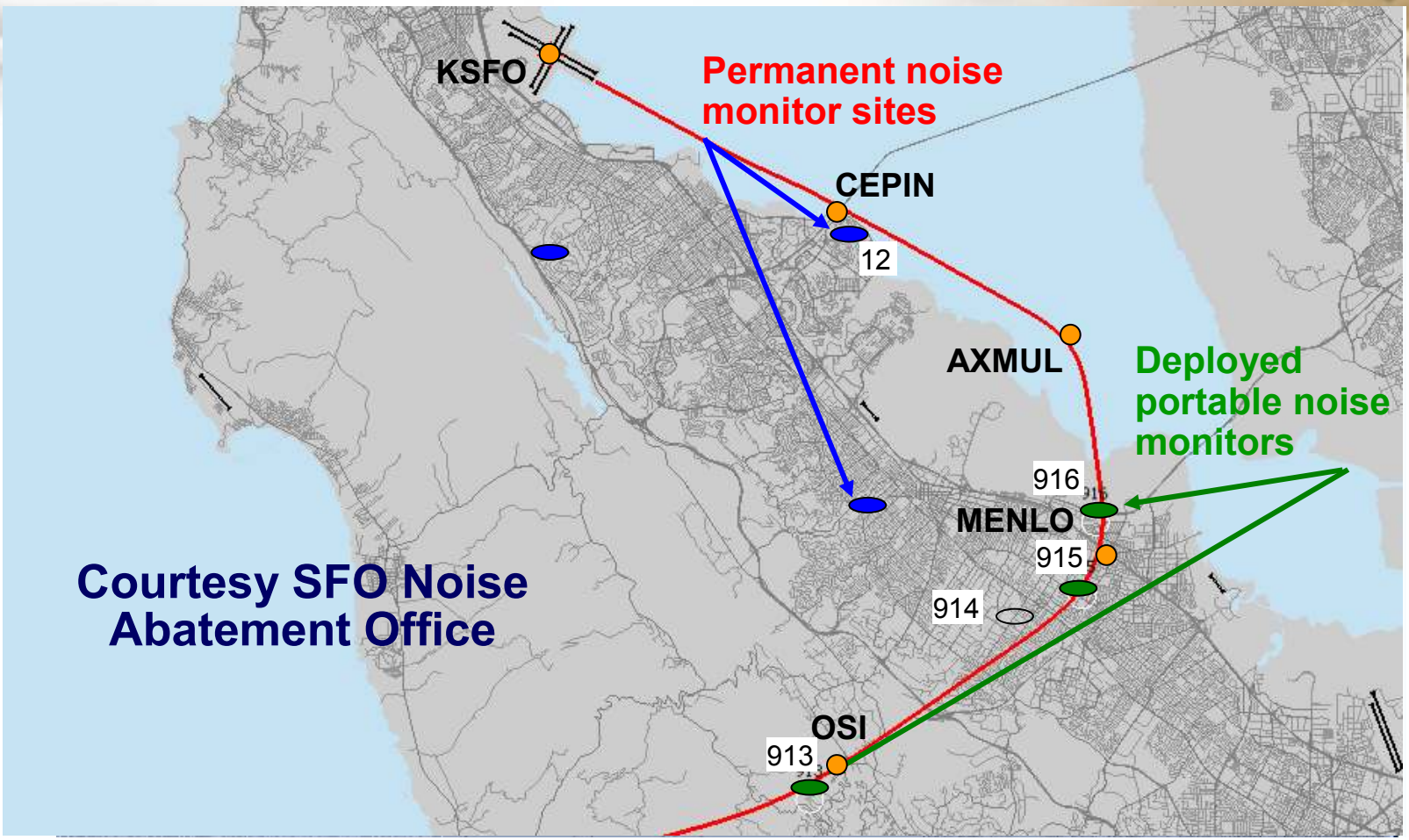
Typical Congested Baseline



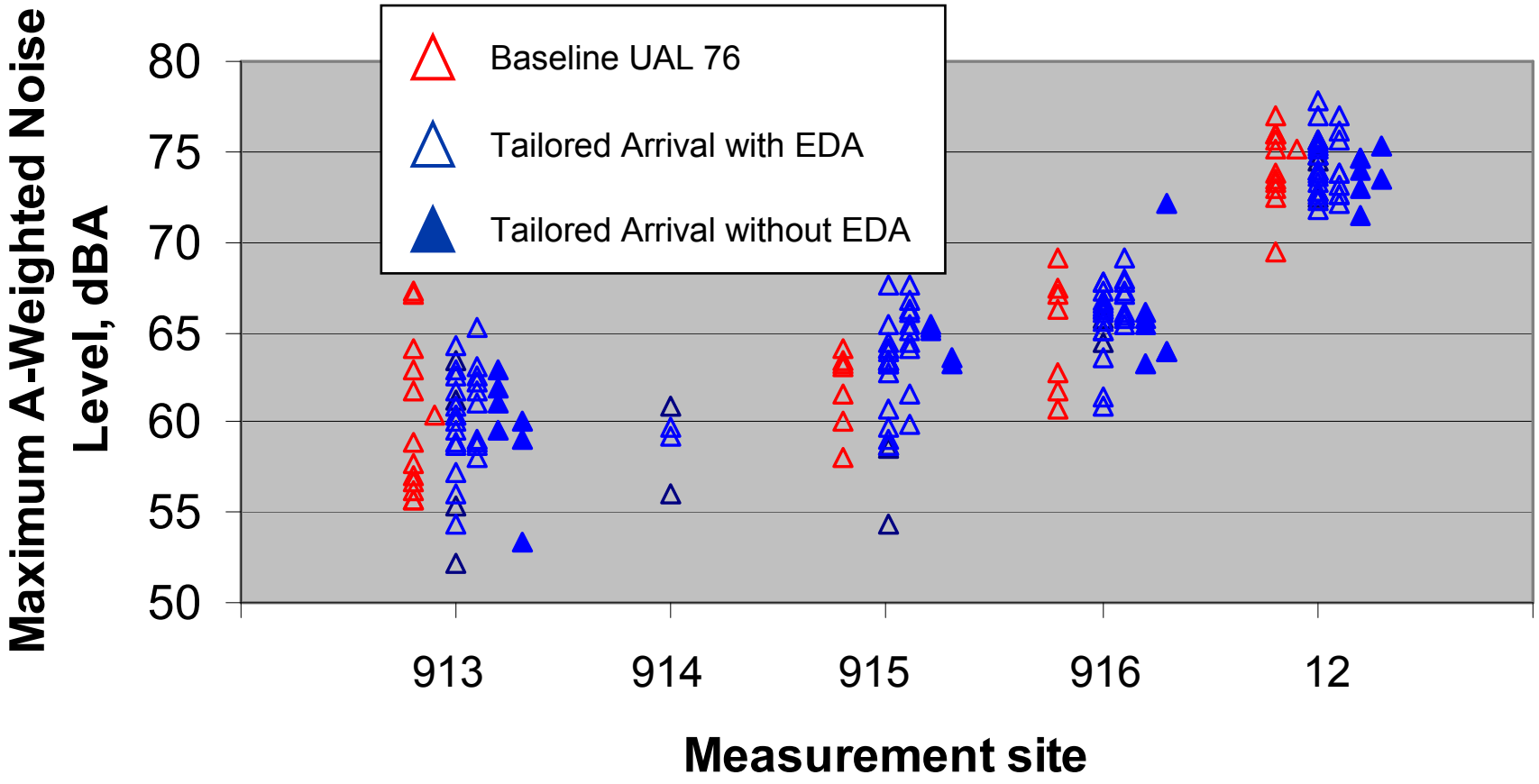
SEL contours

- 72
- 71
- 70
- 69
- 68
- 67
- 66
- 65

Noise Measurements Locations

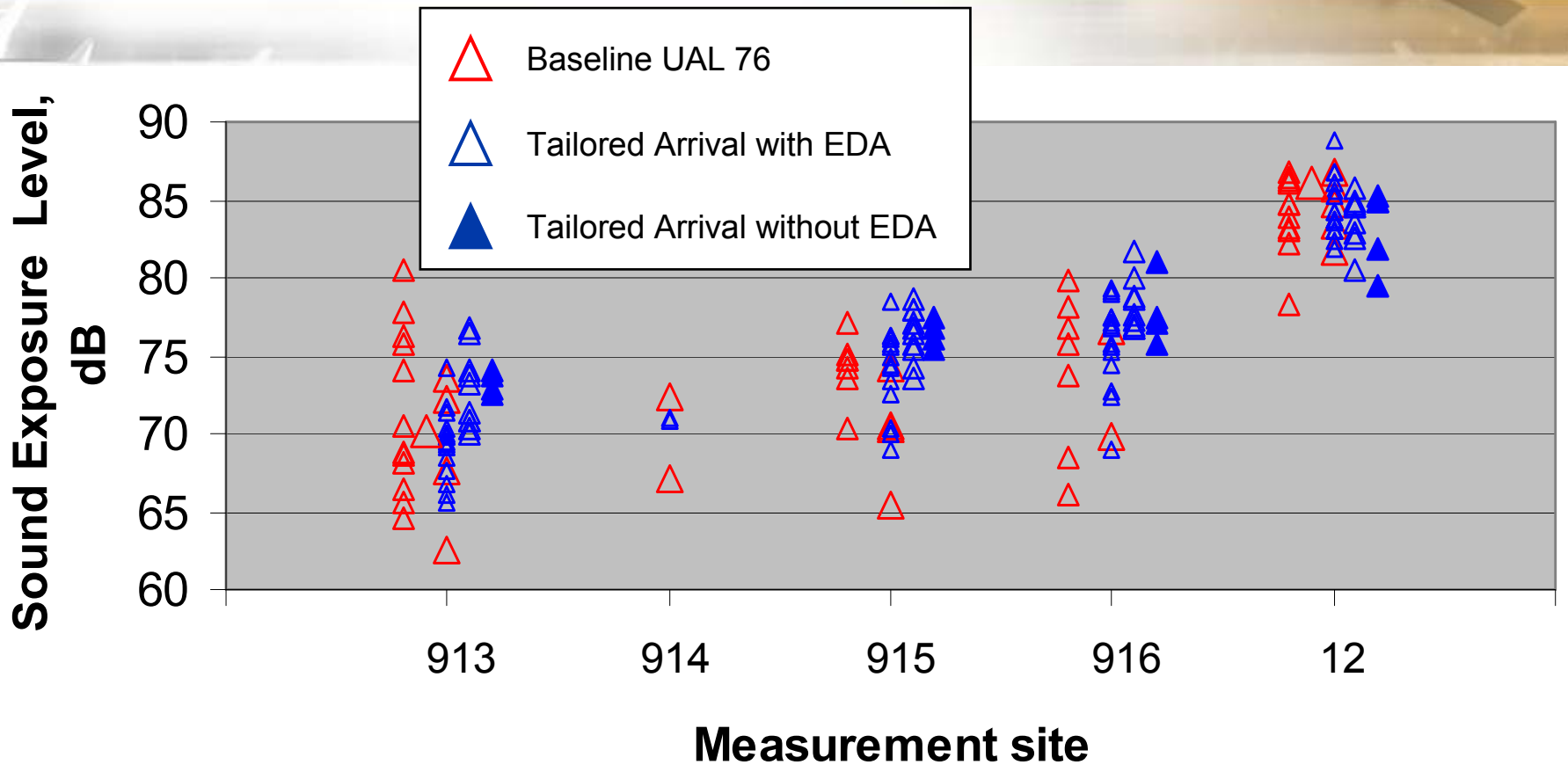


Microphone Noise Measurements
Corrected for Path Offset



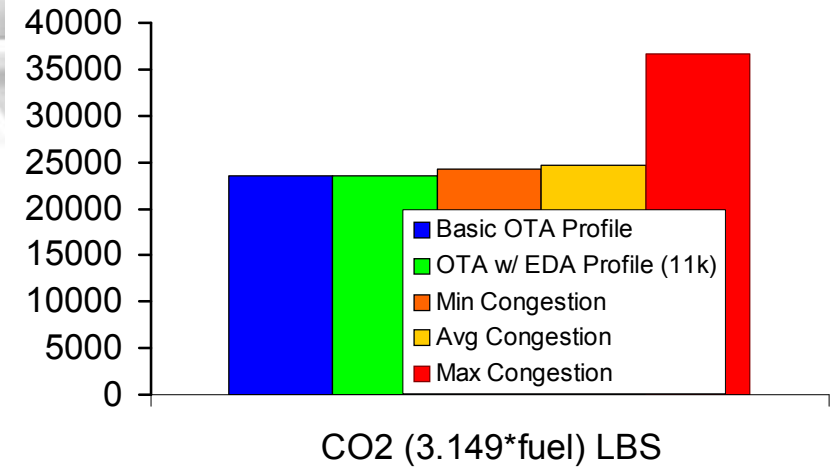
Finding from OTA test (rounds 1 and 2)—no significant change found in noise at measurement locations

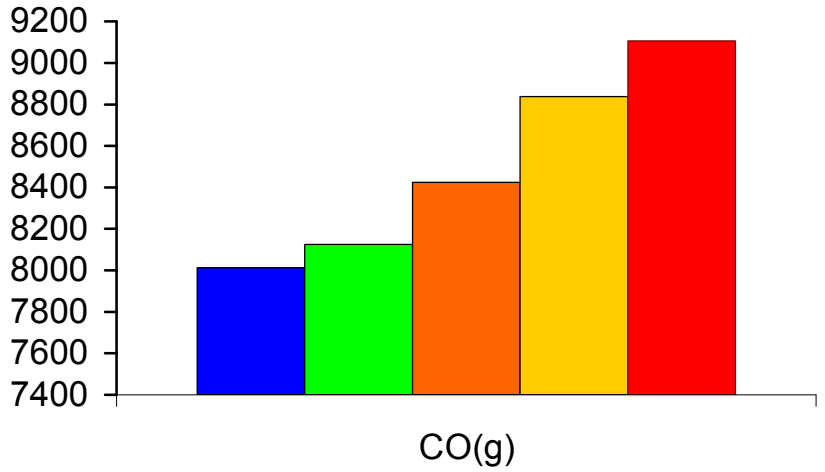
Measured Sound Exposure Level
Corrected for Path Offset

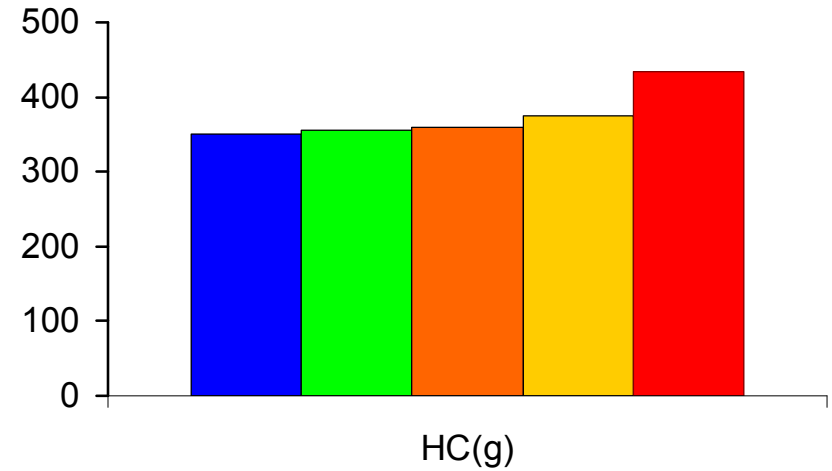


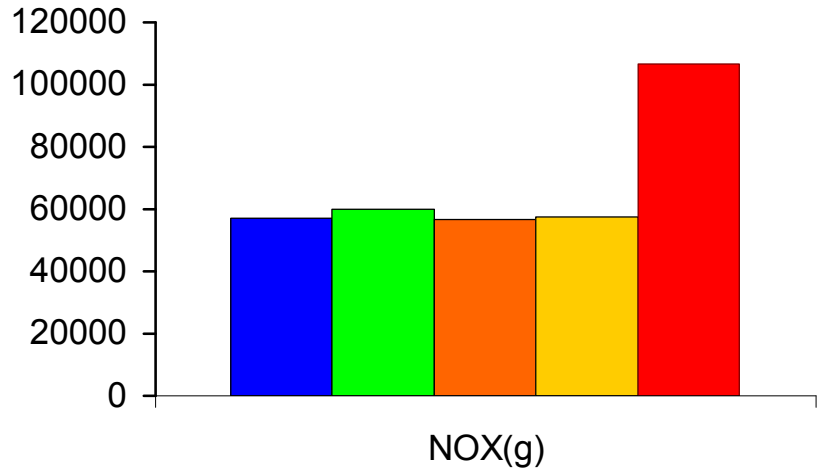
Finding from OTA test (rounds 1 and 2)—no significant change found in noise at measurement locations

Emissions Analysis
Crean to the Runway

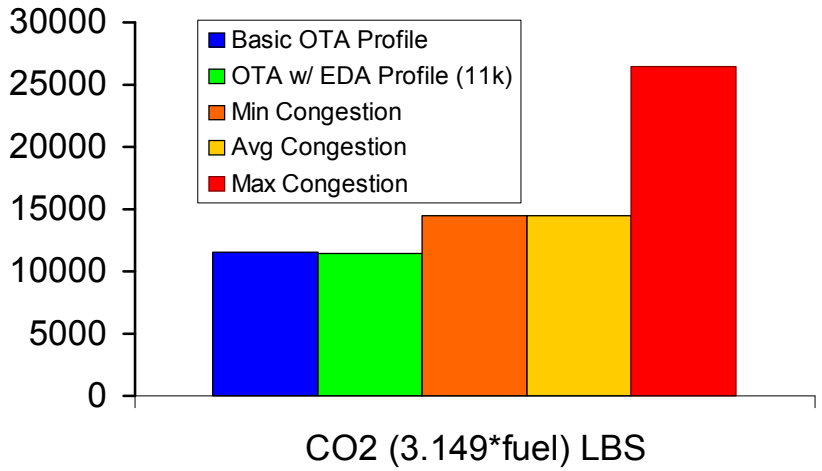


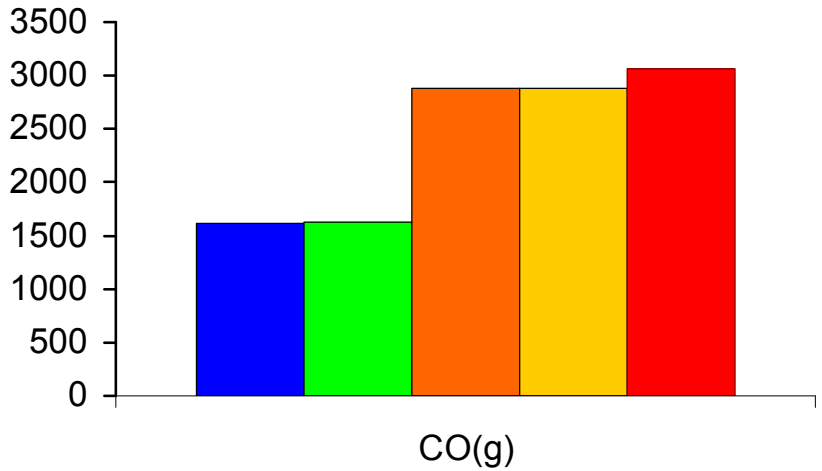


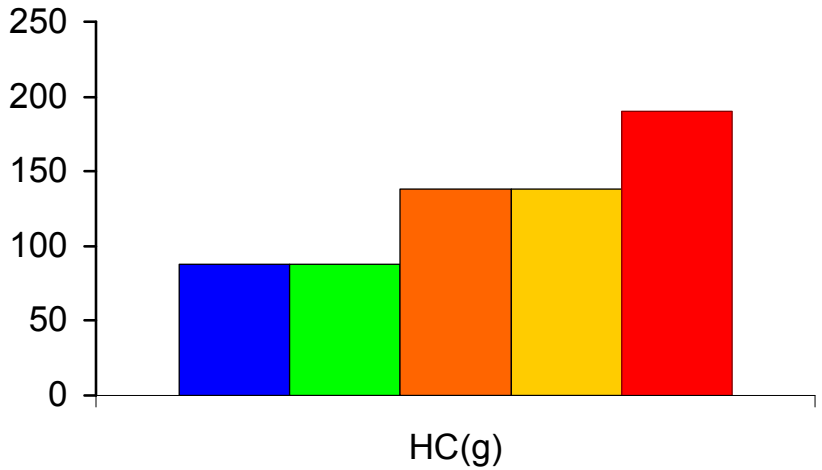


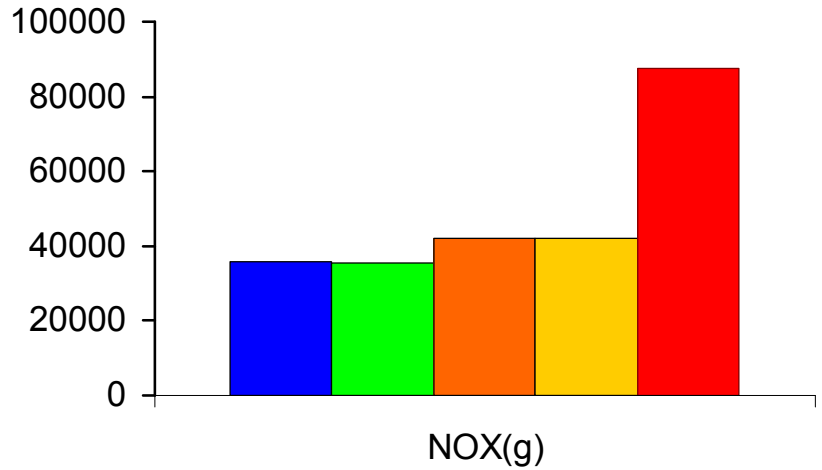


Emissions Analysis
Within the TRACON (from 10,000' high to the Runway)









Summary

- **OTA trials during low-density operations resulted in no significant change in noise levels over communities where current noise abatement procedures exist:**
  - However, compared to congested times, the noise exposure contour area is significantly reduced.
- **Flight time was reduction potential varied from 1 to 12 minutes for low to high congestion operations**
- **Fuel savings potential of 250 lb per flight during minimum congestion**
  - However, this savings increases to 400 to 4,200 lb per flight for congested operations.

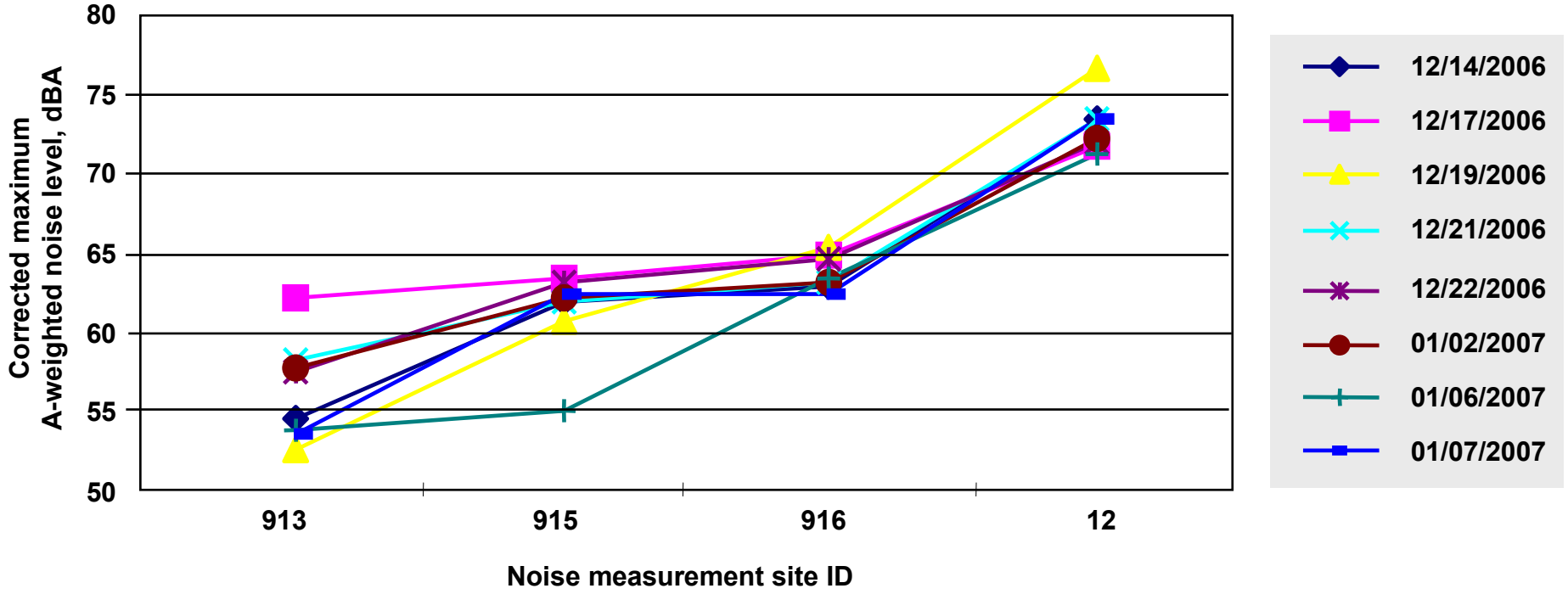
Summary, Continued

- **Total Emissions Reductions (Low to High Congestion):**
  - CO_2 (7 to 72%)
  - CO (5 to 12%)
  - HC (2 to 19%)
  - NO_x (0 to 46%)
- **Emissions Reductions below 10,000' (Low to High Congestion):**
  - CO_2 (41 to 113%)
  - CO (44 to 47%)
  - HC (37 to 54%)
  - NO_x (15 to 59%)

Backup Charts

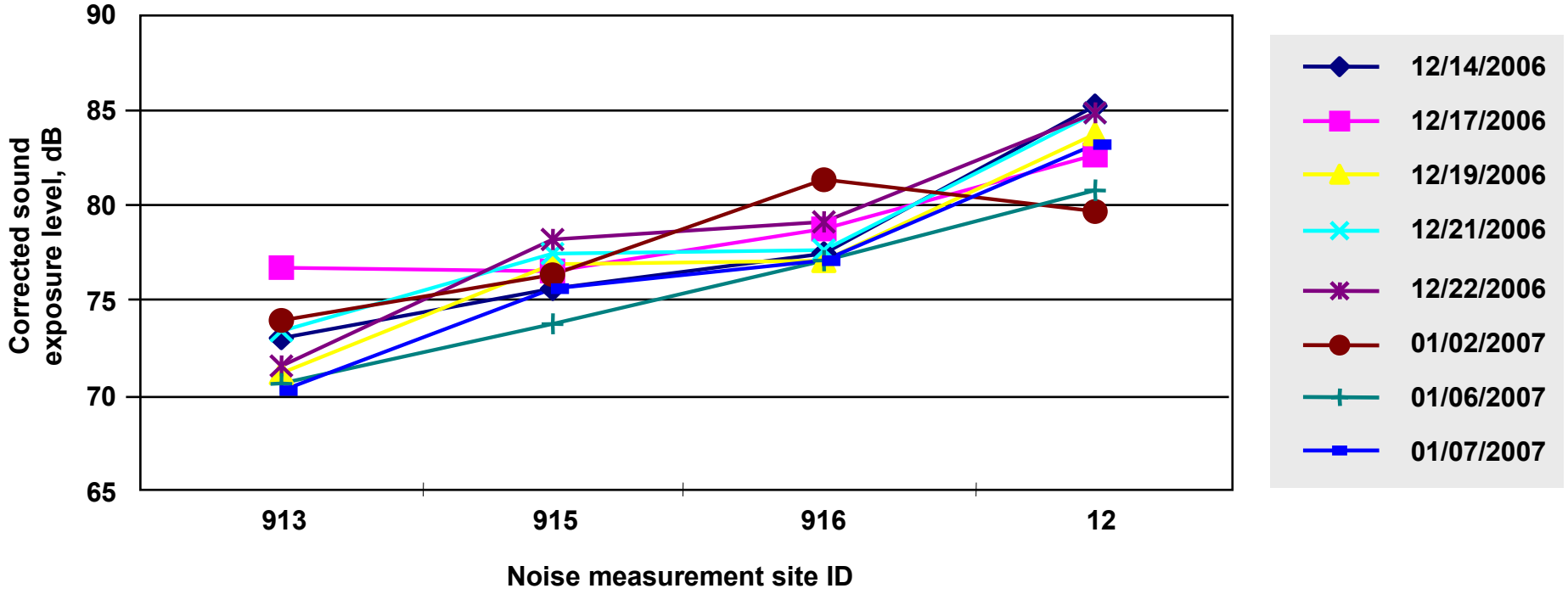
Noise Measurements
Maximum A-Weighted Noise Level

OTA round 2 UAL76 compliant flights

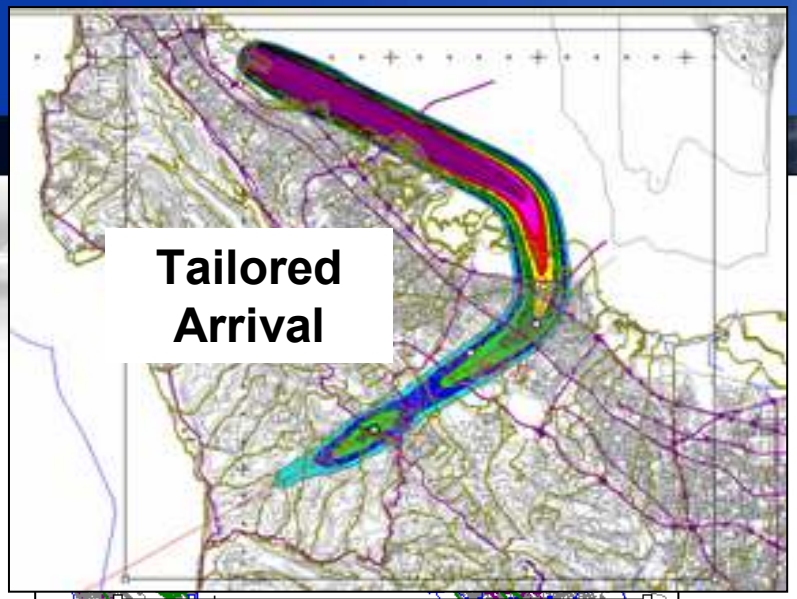


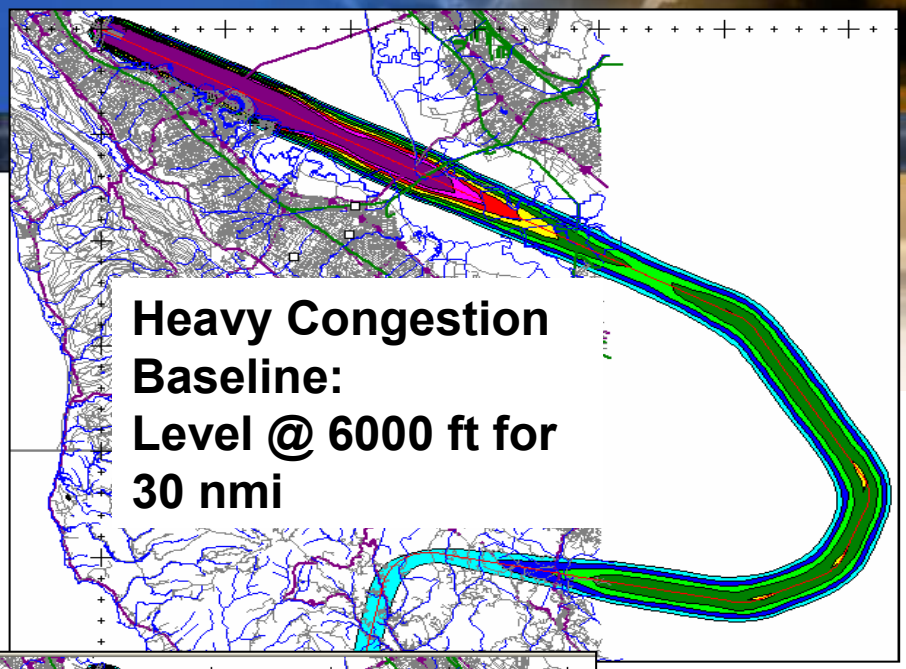
Noise Measurements
Sound Exposure Level

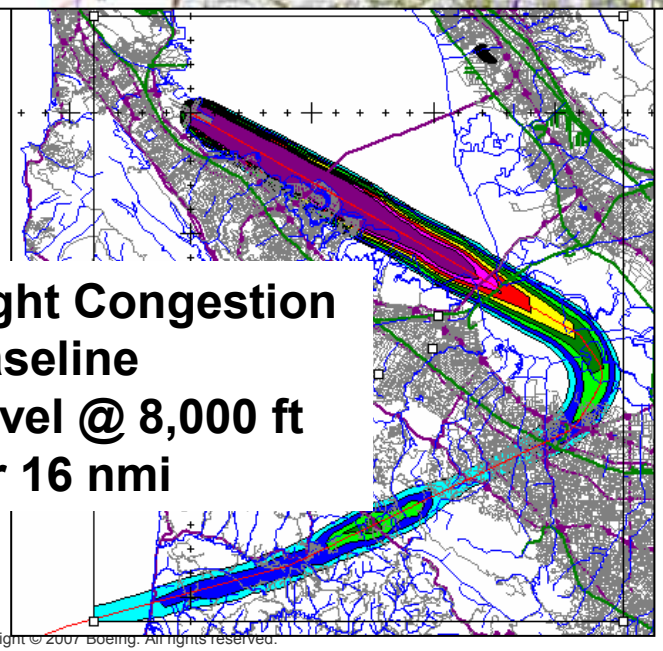
OTA round 2 UAL76 compliant flights

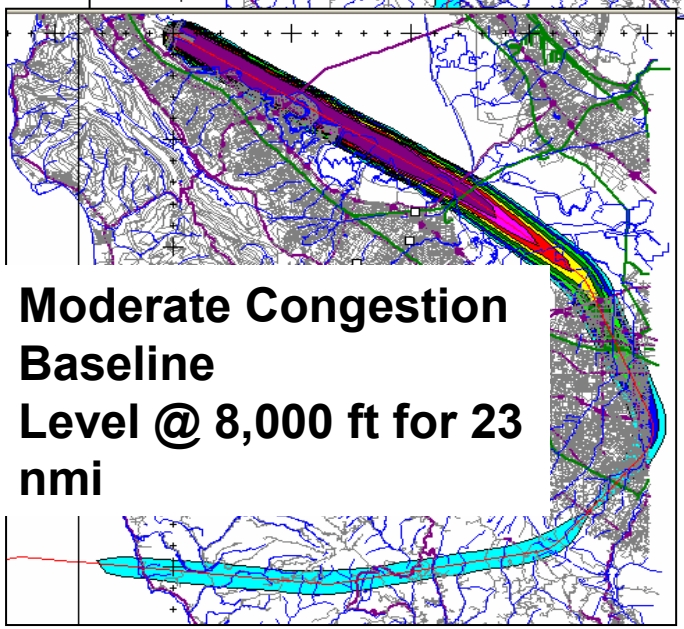


Modeled Noise Contours









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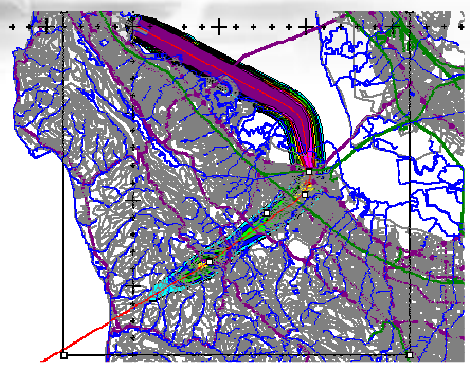
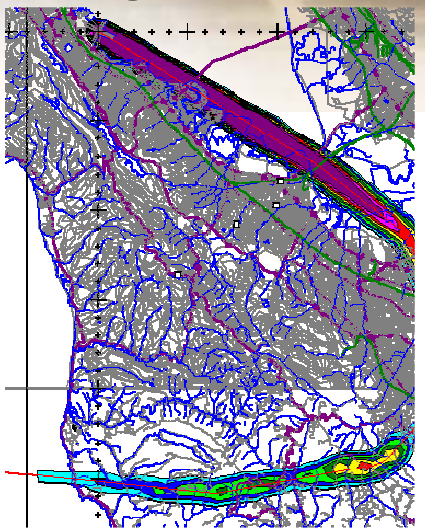
FAA Integrated Noise Model Predictions

Maximum A-Weighted Noise Level Contours

Round 2 EDA OTA

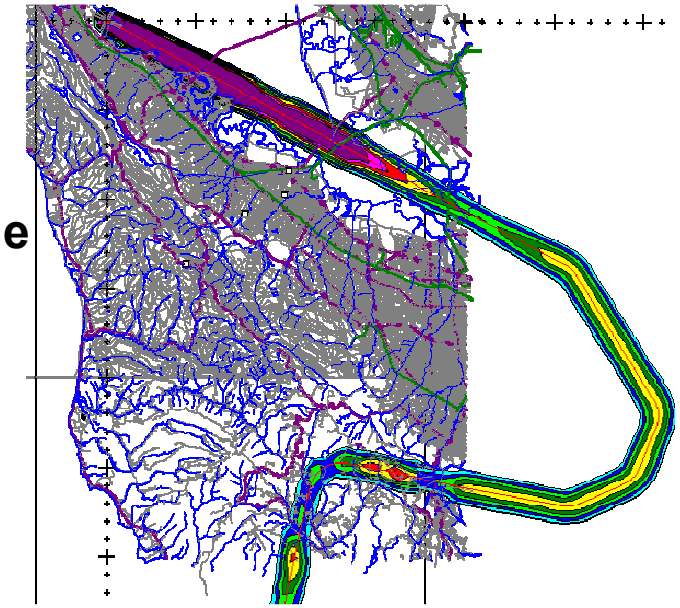


Average Congested Baseline

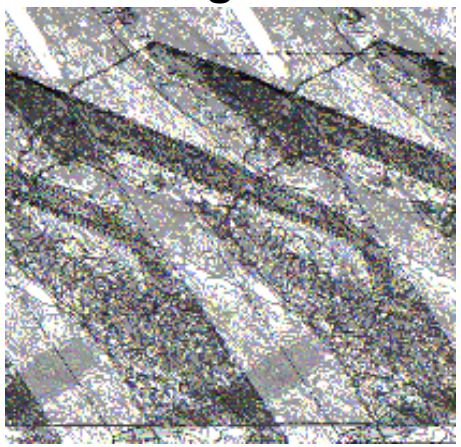


Max Congested Baseline

(incomplete terrain effects)



Typical Congested Baseline



dBAmax contours, dB